

Chemo-Mechanical limitations of liquid alloy anodes for sodium solid-state batteries

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Supplemental figures

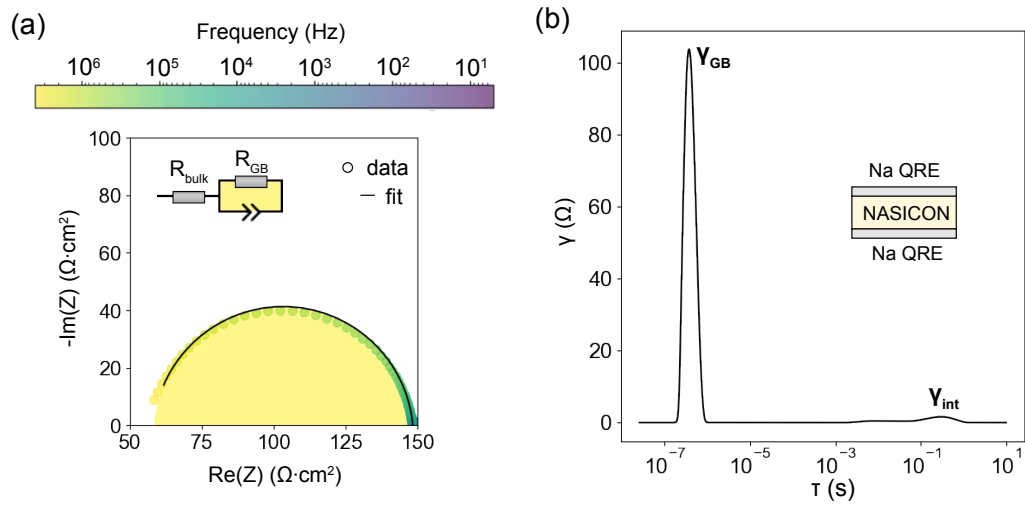


Figure S1 (a) Fitted EIS data collected on Na QRE/NASICON/Na QRE cell and (b) corresponding DRT spectra showing negligible interfacial resistance.

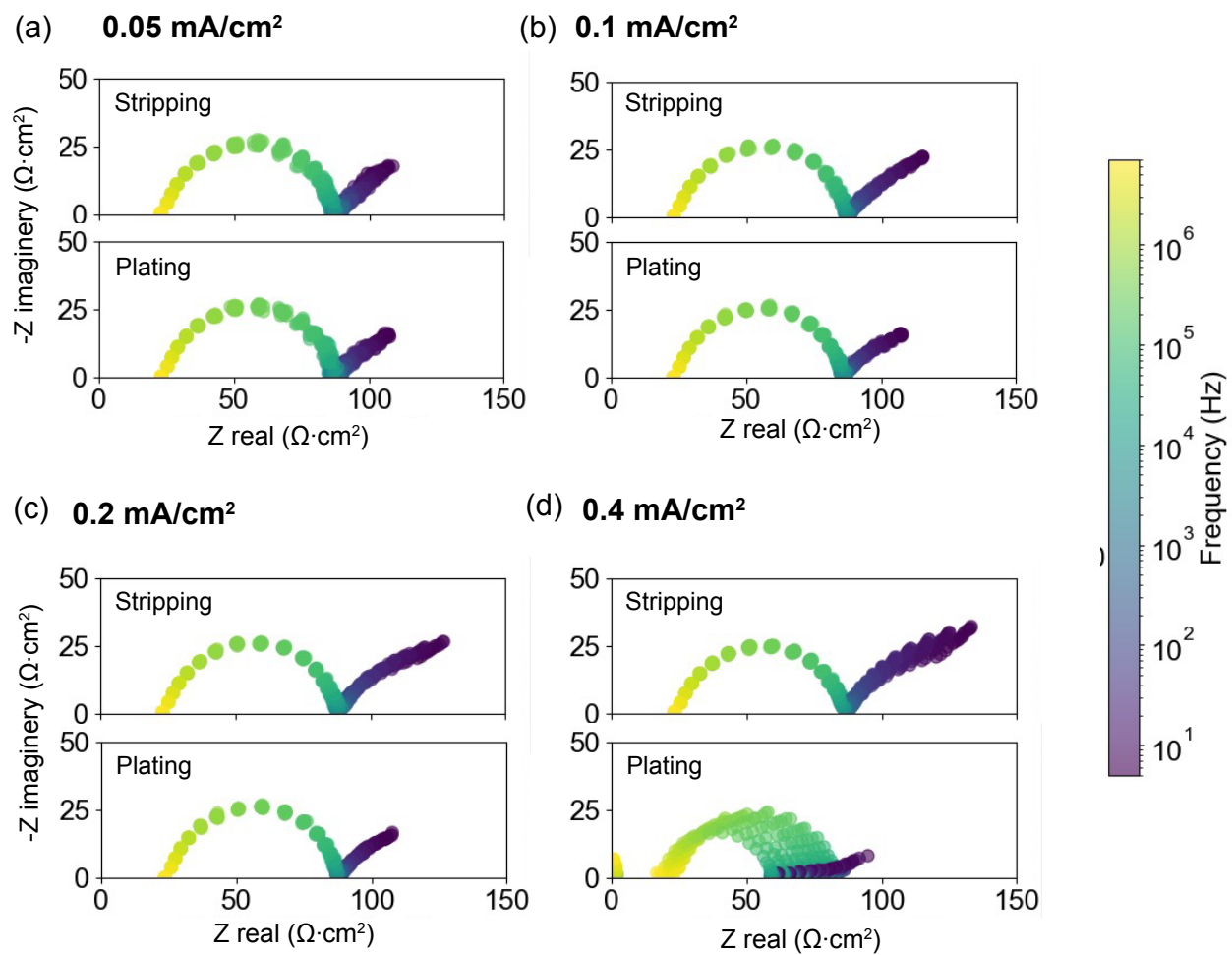


Figure S2 The *operando* GEIS spectra collected during the CCD test of NaK50 liquid electrode under different current densities.

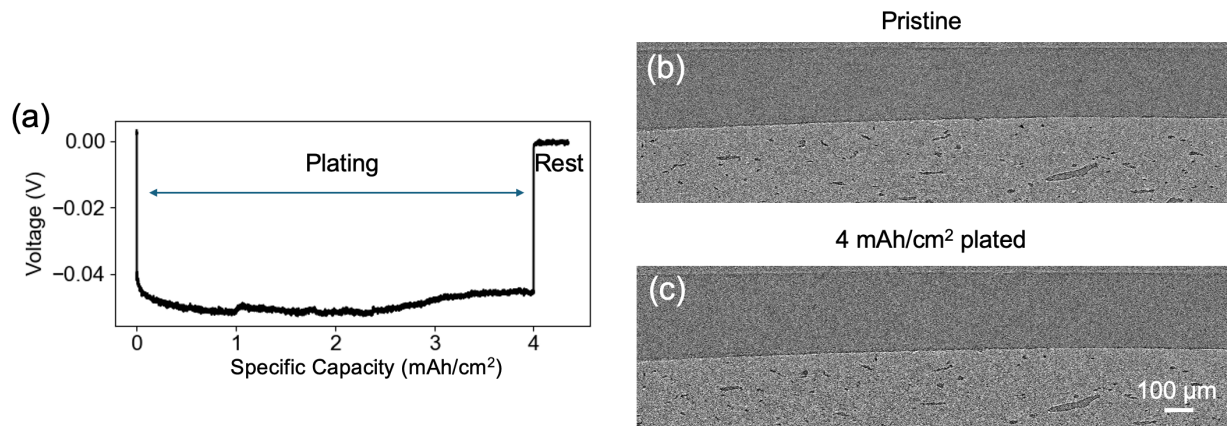


Figure S3 *in situ* XCT collected over Na plating process of NaK liquid anode under 0.4 mA/cm² current density. (a) Voltage profile of the *in situ* XCT cell. (b-c) Reconstructed virtual cross-sections at the NaK/NASICON interface showing homogenous plating without crack formation.

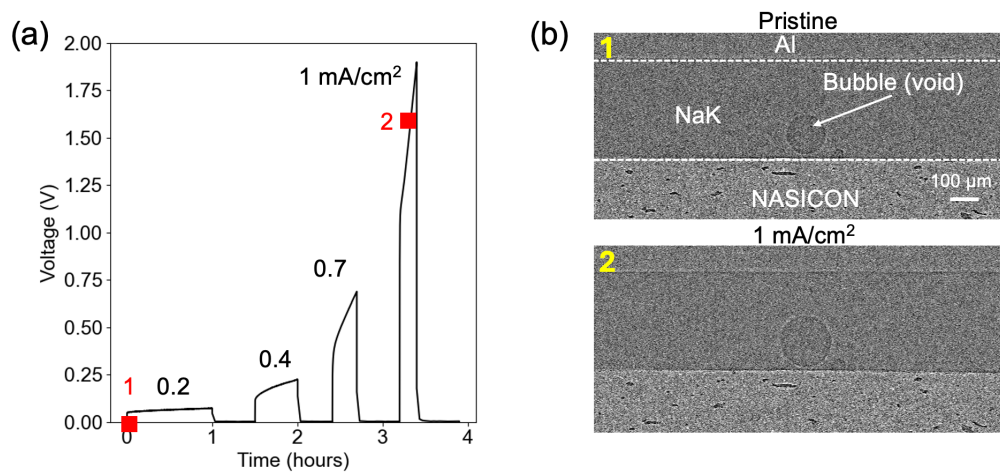


Figure S4 *in situ* XCT collected over staircase Na stripping process of NaK liquid electrode under 0.2, 0.4, 0.7 and 1.0 mA/cm² current densities. (a) Voltage profile of the *in situ* XCT cell. (b) Reconstructed virtual cross-sections at the NaK/NASICON interface.

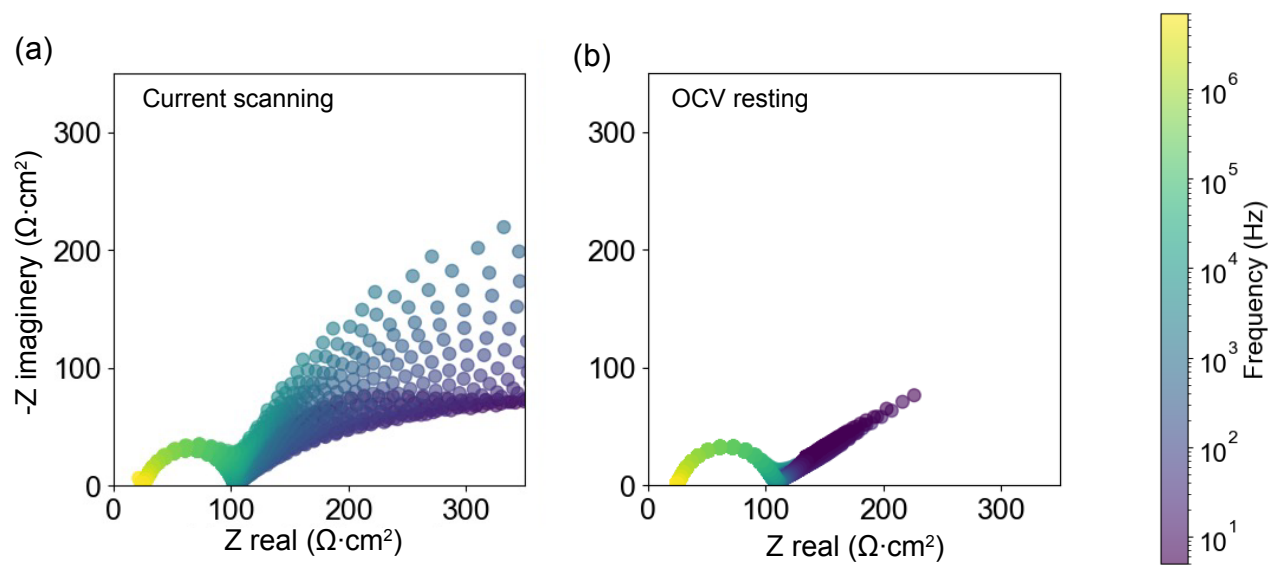


Figure S5 The *operando* GEIS spectra collected during Na stripping current scanning (a) and PEIS spectra collected during subsequent OCV resting (b) of NaK50 liquid electrode.

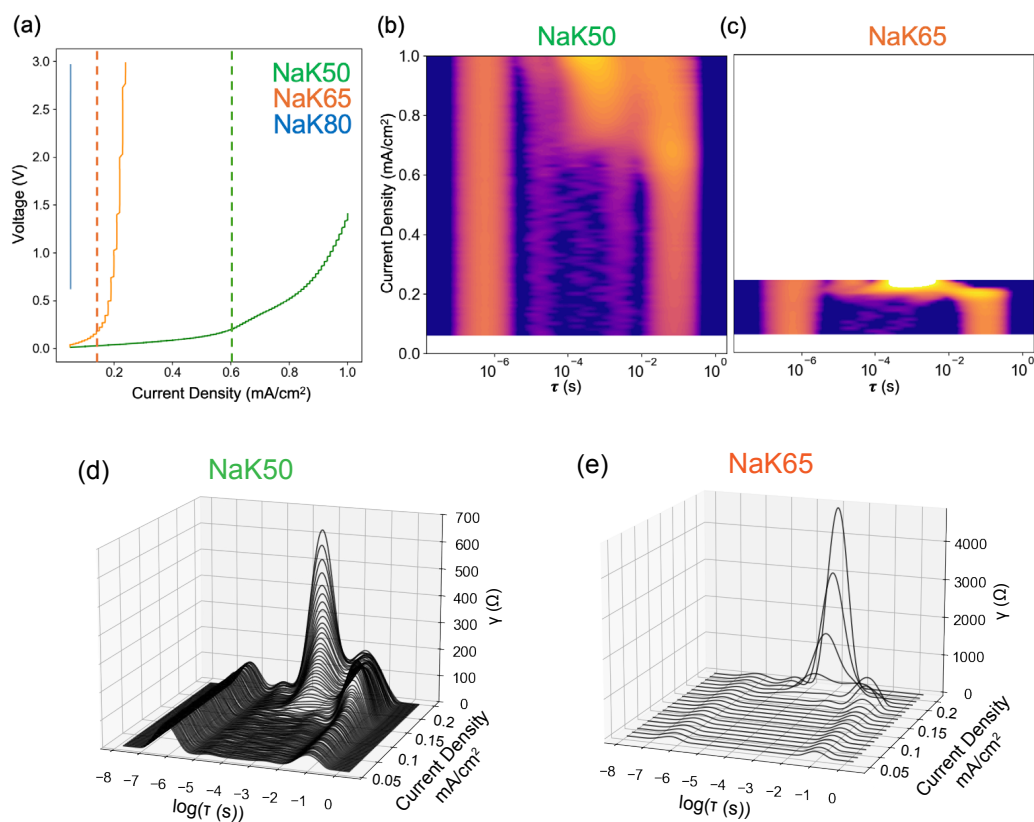


Figure S6 (a) Voltage profiles of current scanning experiment performed in NaK liquid alloys at different Na concentrations. *Operando* DRT spectra as function of Na stripping current density collected on (b,d) NaK50 and (c,e) NaK65 working electrodes.

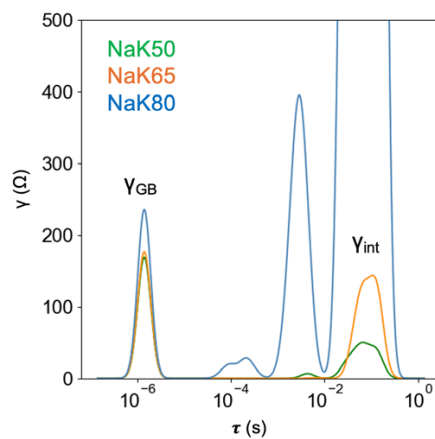


Figure S7 DRT spectra collected on pristine NaK/NASICON/Na cells with NaK50, NaK65 and NaK80 working electrodes.

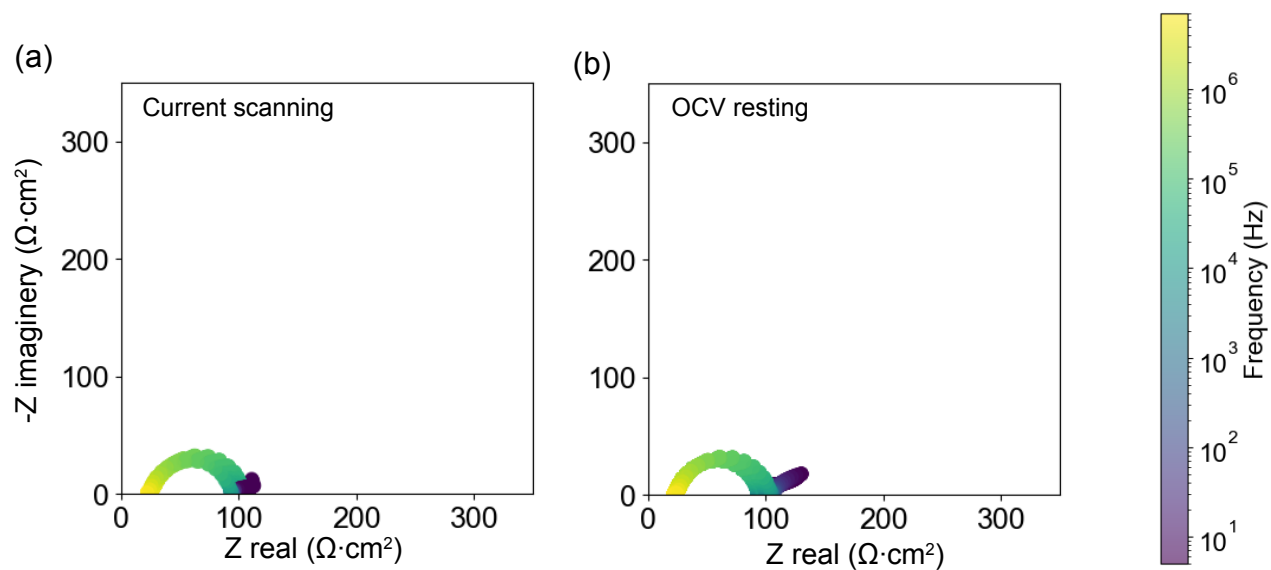


Figure S8 The *operando* GEIS spectra collected during Na plating current scanning (a) and PEIS spectra collected during subsequent OCV resting (b) of NaK50 liquid electrode.

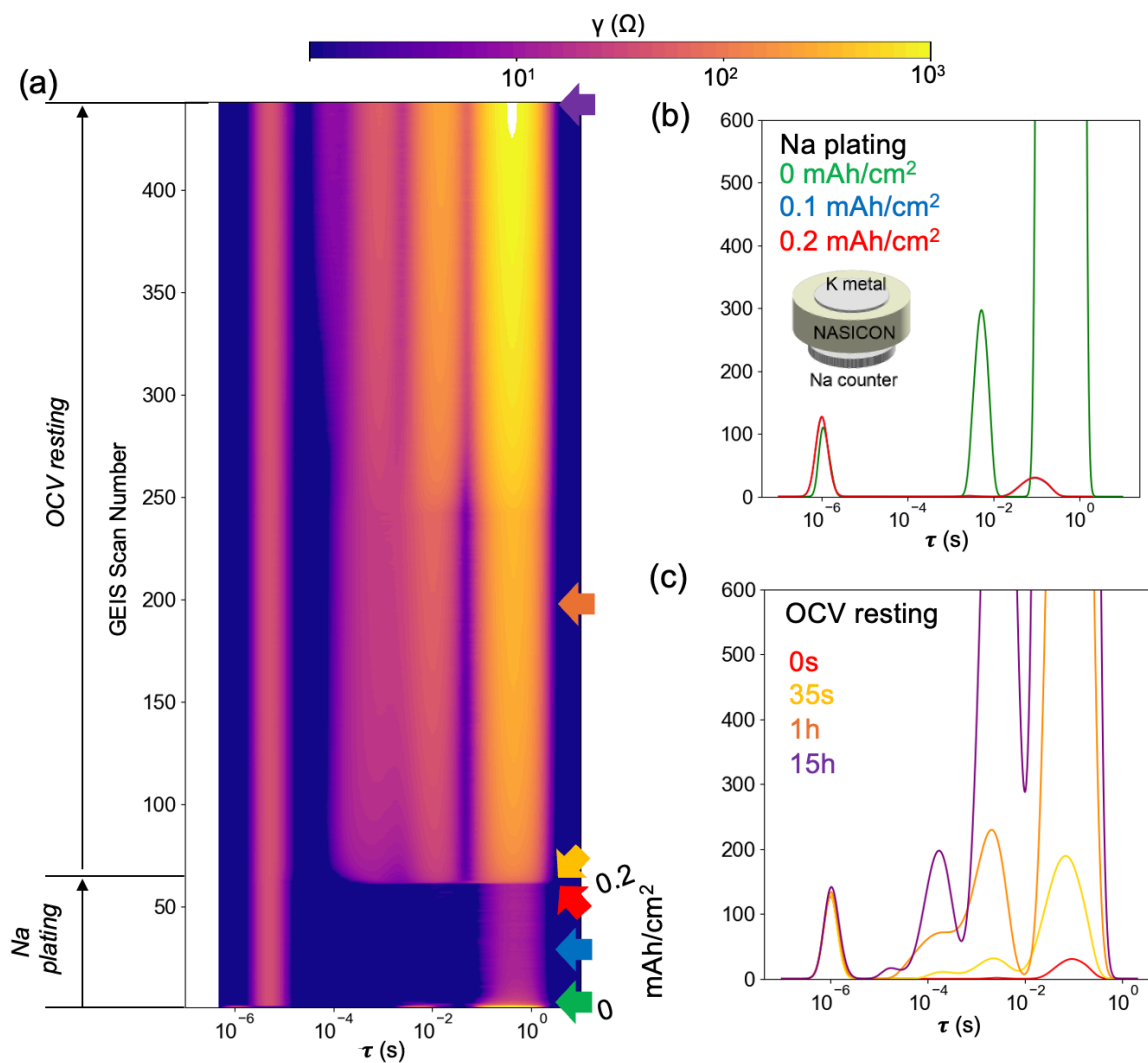


Figure S9 (a) *Operando* DRT spectra obtained during Na plating-OCV resting test on K metal working electrode. (b) DRT spectra overlay over the Na plating process at different plated capacities. (c) DRT spectra overlay over the OCV resting process.